

## **REMARKS/ARGUMENTS**

Claims 1-25 are pending. Claims 1, 3, 6, 7, 9, 12, 14, 18, and 20 have been amended herein. Claims 26 and 27 have been added herein.

### **Rejections Under 35 U.S.C. § 112, Second Paragraph**

The Examiner has rejected Claims 1-11 and 14-15 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention.

The Examiner stated the phrase “a layer of material having a lower acoustic speed” in Claim 1 was vague and indefinite. Applicants have amended Claim 1 to specify that the low acoustic speed is lower than 200 meters per second.

The Examiner also stated the phrase “the acoustic speed of glass” in Claims 3 and 14 had insufficient antecedent basis for this limitation. Applicants have amended Claims 3 and 14 to indicate specific acoustic speeds. Applicants therefore submit that the recitation of acoustic spees in the pending claims is sufficiently definite to meet the requirements of 35 U.S.C. § 112, second paragraph.

### **Claim Rejections Under 35 U.S.C. § 103**

The Examiner has rejected Claims 1-8 and 12-19 under 35 U.S.C. § 103(a) as being obvious over Krstic (International Patent Application No. PCT/AU2000/001059; PCT Publication No. WO01/18479). It is the Examiner’s position that Krstic teaches all elements of the of the currently claimed invention with the exception of several materials that the Examiner argues one of skill in the art would have chosen as obvious choices for the intended purpose.

Contrary to the Examiner’s assertions, Krstic does not teach or suggest principles that have been incorporated into the design of the instant invention as these principles were not previously understood or used by others in this field. These principles are dealt with in the current specification and a brief summary of these principles follows for the convenience of the Examiner.

A landmine explosion causes mainly two effects which take place chronologically in sequence. The first effect is that of shock waves which makes up somewhat less than 50% of the

total energy, followed by a blast effect which accounts for the remaining, somewhat more than 50% of the total energy involved. The current invention deals with the shock wave effect in two ways namely, to guide the shock waves by means of a guide member of a material having a high acoustic speed away from a foot and lower limb of a victim and further to use the shock waves to pulverize the guide member at a speed of crack propagation lower than the acoustic speed of the material to create a path of lesser resistance to the blast. The invention deals with the blast effect by allowing it to follow said path of lesser resistance. The Applicant thus realizes that the two effects of a landmine explosion have to be dealt with differently because of the different characteristics of the effects. The invention achieved this in a synergistic fashion in that the first effect, namely the shock waves, is used to pulverize the guide member material and thus directs the blast effect in a desired direction along a path of lesser resistance, established for this reason.

A second principle is to “soak-out” shock waves which have propagated into the foot and lower limb of the victim by establishing a route of low resistance downstream of the foot and lower limb by means of a soak-out material having an acoustic speed at least as high as that of flesh. It is very important that an interface between the flesh and the soak-out material does not unduly resist propagation of the shock waves across the interface. By way of example, if the interface contains an air gap, propagation is hampered or even prevented causing deflection of the shockwave back into the flesh with very undesirably results.

The structure of Krstic comprises a non-deformable metal plate 5 provided obliquely in the sole with the intention of deflecting the effects of a landmine explosion laterally away from a foot. The metal plate 5 is backed by a reinforcing backing in the form of Kevlar sheets 17 and is further surrounded by a frangible absorbing layer 16b, and an energy dissipating material in the form of a plug 19 between the metal plate 5 with reinforcing 17, and the sole of the boot accommodating the foot. The foot and lower limb are further protected by means of a hard outer shell of the footwear 2 and the protective surround 13 around the lower limb. It is significant that soft, foam material (i.e. containing air pockets) is provided intermediate to the foot and the outer shell 2 and the protective surrounds 13.

In the event of a landmine explosion, the initial shock will thus break up the frangible layer 16b below the metal plate or sheet 5 while attenuating the shock. The remaining shock waves are partially deflected by the metal plate 5 and partially loaded into the metal plate 5.

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Because the plate 5 is made of metal, it has a relatively high acoustic velocity and provides a path of low resistance to the shock waves. The shock waves are guided along the metal plate 5 to the outside of the victim's foot. When the frangible layer 16b is broken up, the metal plate 5 is exposed to the ensuing blast, which then creates a projectile out of the exposed metal plate 5, launching it upwards at the foot and lower limb of the victim.

Applicants submit that Krstic does not teach or suggest that the frangible material 16b be of a material in which the speed of crack progression is lower than its acoustic speed and that it is spalled at a downstream end to create a path of lesser resistance for the ensuing blast. Clearly, it is not the intention of Krstic nor is it physically possible for the metal plate in Krstic to fulfill this role. Indeed, in Krstic it is a requirement that the metal plate be substantially non-deformable (see Krstic at page 5, line 1).

As far as the "soaking out" effect is concerned, the provision of the foam layer surrounding the foot and lower limb, acts as an effective barrier to any shock wave propagated along the foot and lower limb because of the low acoustic velocity of air trapped in the foam material. Instead of "soaking-out" the shock waves, they are deflected back into the foot and lower limb to aggravate destruction.

Applicants further argue that Krstic is not applicable to the specific field or sub-field of the current invention because when viewed in its entirety, Krstic's "detsheet" ("sheet 8" of Krstic), and the counteracting explosion caused thereby, is central to the efficacy of the Krstic device. Thus, Krstic's "detsheet" is analogous to the use of active armor and one skilled in the art would not seek or find assistance from the teachings of Krstic when faced with the problem which is addressed by the current invention.

### **Claims 1 and 12**

The method of Claim 1 and the article of footwear of Claim 12 provide an oriented shock wave guide member of high acoustic velocity material to guide the shock waves obliquely laterally away from a foot of the victim. The guide member material is prone to pulverization by the shock waves at a crack progression speed less than the acoustic speed, so as not to prejudice the guiding capability of the material. The pulverized material follows the shock waves to and through an area of spalling at the side of the composite sole and provides an open path of low

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resistance to the ensuing blast.

It is respectfully submitted that Claims 1 and 12, have been amended to more clearly distinguish them over the prior art.

Therefore, Applicants submit that Claim 1 is a nonobvious method of protecting a foot of a human from the effects of a landmine and that Claim 12 is a nonobvious article of footwear and thus are patentable over Krstic. Applicants respectfully request that the rejections under 35 U.S.C. § 103(a) be withdrawn. Moreover, Applicants respectfully submit that Claims 2-8 and 13-19, which depend directly or indirectly from Claims 1 and 12 are also patentable.

### **Claims 2 and 13**

Claims 2 and 13 depend from Claim 1 and 12 respectively. Claims 2 and 13 add further limitations to the method and article of footwear. Specifically, Claims 2 and 13 of further define the direction/path in which the shock is guided away from the foot and in which the ensuing blast is caused to follow. Applicants submit that if Claims 1 and 12 are allowed, respectively, Claim 2 and 13 should be allowable as well.

### **Claims 3, 14, and 15**

Claims 3, 14 and 15 are directed at a preferred aspect/feature which is not disclosed in the prior art. Applicants respectfully submit that the reference to fiber glass (or fiber glass reinforced) in the prior art is irrelevant in the context of either high acoustic speed or pulverization by shock waves; fiber glass has a relatively low acoustic speed dictated mostly by the acoustic speed of the fiber material, and is, generally, resistant to shock. These claims are thus directed at an aspect feature that is not found in the prior art. Applicants submit Claims 3, 14, and 15 are nonobvious and thus allowable.

### **Claims 7 and 18**

Claims 7 and 18 have been amended to add the following limitation:

“the strips being arranged in oblique layers having upstream ends which are located proximate the sole at transversely spaced positions, the layers extending upwardly outwardly towards their downstream ends positioned proximate an outer side of a sole of the article of

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footwear."

Applicants respectfully submit that this arrangement optimizes the guiding of the blast away from a wearer's foot. It will be appreciated that the first part of the shock wave guide element which will be exposed to the shock wave will be the upstream end. Accordingly, the shock wave material of the shock wave guide elements will be cracked from the upstream end towards the downstream end which is positioned upwardly and outwardly of the upstream end. In addition, the fact that the upstream ends of the strips are transversely spaced across the width of the sole further serves to guide a shock wave over the entire width of the sole upwardly and outwardly.

In contrast, in Krstic, although the layers 16a and 16b are inclined upwardly and outwardly, they extend substantially across the entire width of the sole with their transversely inner ends being positioned adjacent to the inner side of the sole. This will, in all probability, result in the shock wave impacting the frangible material at a position between its ends which could in fact cause transmission of the shock wave both towards the outer edge of the boot and towards the inner edge of the boot, which, naturally, is undesirable. Applicant's submit Claims 7 and 18 are nonobvious over Krstic and thus allowable.

### **Claims 8 and 19**

Applicant submits that Vermiculite is not disclosed in the prior art. It has a special property namely, that its acoustic speed is or approaches zero, which is not achieved by any other material disclosed in the prior art. Applicants submit that choosing Vermiculite would not have been an obvious design choice and, thus, Claims 8 and 19 are nonobvious and allowable.

### **Claims 9-11 and 20-25**

The Applicants gratefully acknowledges the Examiner's indication that Claims 9-11 and 20-25 contain allowable subject matter. Accordingly, Claims 9 and 20 have been amended as independent claims incorporating all the features of Claims 1 and 12, respectively. Applicants respectfully submit Claims 9 and 20, as amended, are allowable. Further, Applicants respectfully submit Claims 10, 11, and 21-25 are accordingly allowable because they depend directly or indirectly from Claims 9 and 20.

**Claims 26 and 27**

Claims 26 and 27 have been added and are directed to the distinguishing features of Claims 9 and 20, namely, the inclusion of an article of protective footwear of the “soak-out” material.

Reference is made to the above comment, more specifically the use of a foam material intermediate to the foot/lower limb, and the protective surround to the effect that air trapped in this foam material would prevent “soaking-out” of the shock. The relevant claims in the current invention are all limited to the feature of fluid soak-out materials of acoustic speed at least equal to that of flesh, which is in, or is arranged in close contact with the skin. This feature is not disclosed in the prior art, and the disclosure in Krstic shows clearly that the mechanism of “soaking-out” is either not intended at all or is not understood at all. The disclosure in Krstic appears to have in mind protecting the foot and lower limb against a blast effect, alternatively, possibly to act as a “cage” (i.e. a Faraday cage) to conduct shock around the foot and limb. There is no possibility that it can “soak-out” shock waves which have already propagated into the foot or limb because of the air trapped in the foam at the interface which hinders, even prevents, propagation of shock waves across the interface and causes deflection of the shock waves back into the lower limb or foot.

Applicants emphasize the importance of this aspect with reference to observations of footwear worn by landmine victims. It was observed that, at least in some instances, the lower portion (especially the sole) of the footwear, was, astonishingly, intact, whereas the upper portion of the footwear was shattered. Applicants concluded that the damage was caused by spalling when the shock wave reached the interface between skin and the footwear upper (effectively air between the skin and footwear upper and air immediately outside of the footwear upper). The shock waves that deflected back into the flesh/bone when they encountered the air, which has a relatively lower acoustic velocity and which thus offers high resistance to propagation of shock waves. This effect causes a build-up or concentration of energy at the interface, having the disastrous effect on the downstream portion of the foot or limb and the footwear upper.

The situation is ameliorated in accordance with the features of Claims 26 and 27.

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Applicants respectfully submit Claims 26 and 27 are clearly distinguishable over the prior art and are presently allowable.

Therefore, Applicants submit that the present invention is nonobvious over the Krstic reference and respectfully request that the rejections under 35 U.S.C. § 103(a) be withdrawn.

Based upon the foregoing, Applicants believe that all pending claims are in condition for allowance and such disposition is respectfully requested. In the event that a telephone conversation would further prosecution and/or expedite allowance, the Examiner is invited to contact the undersigned.

Respectfully submitted,  
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Date: September 26, 2008